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Spring 2020

## CE 360-102: Sustainable Civil Engineering Materials (Revised for Remote Learning)

Matthew Adams

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**Course Syllabus**  
**CE 360: Sustainable Civil Engineering Materials**  
**John A. Reif, Jr. Department of Civil and Environmental Engineering**

**Course Information**

Title: CE 360, Sustainable Civil Engineering Materials  
Class Location: Tiernan Lecture Hall 1  
Meeting Times: Tuesdays 6:00 PM – 8:50 PM  
Credit Hours: 3 Credits

**Instructor**

Matthew P. Adams, Ph.D.  
He/His Pronouns  
Office: Colton 237  
E-mail: [adams@njit.edu](mailto:adams@njit.edu)  
I respond to course e-mails twice a day,  
and do not check e-mails on Saturday or  
Sunday.

**Office Hours**

Tuesdays: 2:00 – 5:00  
Open door policy (if the door is open,  
come on by).  
By appointment, skype appointments also  
available.

**Required Pre-requisites**

The required prerequisites for this course are MECH 237 and CHEM 121.

**Course Description**

The course provides instruction on civil and construction engineering materials used in the construction of civil engineering projects such as pavements, bridges, buildings, retaining walls, tanks, etc. Additionally, the fundamentals of sustainability within the context of civil engineering will be discussed. In particular, the course concentrates on the engineering properties of aggregates, wood, metals, portland cement concrete (PCC) and hot-mix asphalt (HMA) as well as the mixture design of PCC and HMA, as well as other advanced civil engineering materials. These materials will be used to discuss sustainability and sustainable design within civil engineering contexts.

Topics: Civil and construction engineering materials; aggregate, portland cement concrete, asphalt concrete, wood, metals. Standard test methods. Sustainability. Sustainable design. Chemistry, mechanics, and durability of materials.

**Learning Outcomes**

Upon completion of this course, students will be able to:

1. Define sustainability in their own words and relate how sustainability is defined in the context of new construction as well as renovation and rehabilitation.
2. Demonstrate concepts of life-cycle analysis including economic and sustainability aspects and apply these concepts to sustainable construction.
3. Identify key material properties important to the successful application of aggregates, asphalt concrete, portland cement concrete, wood and metals to a variety of civil works.

4. Specify aggregates, concrete and asphalt mixtures, metals, and wood for typical construction applications including the use of appropriate standards (i.e. ASTM) for testing and specification of said materials.
5. Design a PCC mixture and an HMA mixture using sustainability concepts that will be durable and meet the requirements of a particular construction project.

## Required Reading Materials

### Required

- A. *Design and Control of Concrete Mixtures*, Kosmatka, S.H. and Wilson, M.L., 16<sup>th</sup> Edition, Portland Cement Association, 2015
- B. Pavement Guide Interactive: <http://www.pavementinteractive.org/> (free internet resource)
- C. Additional course reading materials will be posted on the Moodle course website throughout the term.

### Additional

- Virtual Superpave Laboratory: <http://training.ce.washington.edu/VSL/>  
Portland Cement Association: [www.cement.org](http://www.cement.org)  
American Concrete Institute: [www.aci-int.org](http://www.aci-int.org)

## Attendance Policy

Students are expected to be on time for class, and to remain in class during the entire period. Chronic lateness or leaving of class for extended periods of time will result in a reduction of a student's participation grade. Regular attendance in class will greatly increase your ability to perform well on the exams, quizzes, homework, and class assignments. If a student must miss a class or an exam please contact the professor to discuss the issue at least 24 hours **prior** to missing the class. Students will not be allowed to makeup exams or quizzes if the professor is not contacted prior to the class. If a student had a serious medical issue, death in the family, or other excusable emergency absence, the student is required to obtain an excused absence from the Dean of Students prior to asking for a make-up.

## Homework Assignment Requirements and Grading

Homework assignments will be posted on the course website regularly throughout the term. Students will have at least 7 days to complete homework assignments from the date they are posted. Homework assignments are due by the end of class on the due date. Homework will be collected and graded in the following manner:

- All problems will be checked for completeness.
- One question, chosen at random, will be graded.
- All homework will be graded for professionalism and legibility

Method of Collection. All homework will be collected via Canvas, the course website. Homework must be submitted by 11:59:59 PM on the day it is due. Please note the following items:

- Homework must be turned in as 1 single file. If you need to combine typed responses with hand written calculations, you must scan in your hand-written portions, and import them into the word document that you have typed or inserted as a page into the PDF.
- It is the student's responsibility to ensure that the homework is correctly uploaded to Canvas. If you are having issues with Canvas contact the Canvas help desk, the professor is not able to help with IT/Technical issues.
- Turning in the homework at 12:00:00 AM or after on the day after the homework is due will still count as a late homework. It is recommended you plan to turn in your assignment earlier than the deadline to ensure any uploading issues are able to be fixed and you can turn your homework in on time.

Homework assignments are expected to look professional and be legible. Up to 25% of each homework will include points for meeting the criteria below. Homework assignments will meet the following requirements:

- Each page will have a header that includes student name, date, course number, assignment, and page number.
- All homework will be completed on fresh paper with clean edges (not ripped out of a notebook). Engineering paper is preferred when completing assignments by hand.
- Assignments **do not** have borders around the pages or unnecessary cover pages.
- Written sections have correct grammar and spelling.
- Handwriting is legible
- Each question is clearly labeled, with the given information, what you are required to answer, and the solution clearly marked.

An example of a correctly formatted homework is attached at the end of this syllabus.

Assignments must be submitted by 11:59:59 PM on the date they are due through [Canvas.njit.edu](https://canvas.njit.edu). Any assignment turned in later than this time be considered late unless prior arrangements are made with the instructor. **Late homework will be accepted up to 24 hours after the assigned due date and time for a loss of 50% of the earned points.** No late homework will be accepted after 24 hours.

## Grade Determination

The course grade will be determined using the following point breakdown:

Homework Assignments	125 Points total (5 Homework assns. at 25 points each)
Quizzes and In Class Exercises	100 Points total (10 items at 10 points each)
Exam 1	75 Points total
Exam 2	75 Points total
Final Examination	125 Points total

The course is scored out of a total of 500 points. Grading will not be completed according to a curve Letter grades will be determined using the following guidelines:

A = 450 points and above

B+ = 425 – 449 points

B = 400 – 425 points

C+ = 375 – 399 points

C = 350 – 374 points  
D = 325 – 349 points

F = Below 325 point

### **Course Quizzes and In-class Exercises**

Ten quizzes or in-class exercises will be given throughout the term. Quizzes will either be pop quizzes given in the first 15 minutes of class. If you are late to class you will not be able to make up the quiz. Quizzes will be graded out of 10 points. The lowest quiz grade will be dropped at the end of the term.

In-class exercises will generally take up a significant time in class and will be done in pairs or groups. Exercises will not be scored, but instead students will get full credit for completing the exercise. The lowest in-class exercise grade will be dropped at the end of the term.

If you have an emergency and miss a quiz or in class exercise without prior approval from the professor, you must contact the Dean of Students who will review your case and determine whether an absence should be allowed.

### **Course Exams**

Three exams will be given during the term, two during the term and a final exam. Each regular exam will be out of 75 points, and the final exam will be out of 125 points. The final exam will be cumulative of the whole semester. Exams will include both a multiple-choice portion, calculation sections, and a written response portion.

Missed examinations will not be allowed to be made up without prior consent from the professor. If a student will be missing an examination, please contact the professor at least **24 hours prior** to missing the exam.

If you have an emergency and miss an exam without prior approval from the professor, you must contact the Dean of Students who will review your case and determine whether an absence should be allowed.

### **Day of Exam Policies**

The following guidelines will be followed during exams. Failure to follow these may result in a grade of zero on the exam.

- Student will place phones, watches, and any other smart devices in a backpack, and close the backpack prior to the start of the exam. If a student wants to know the time, they may ask the exam proctor.
- The only items allowed on a student's desk during an exam are the following: Calculator, pens/pencils (removed from a pencil case), an eraser, the exam papers, a clear bottle containing a drink.
- Calculators: The calculators allowed for use on the exam are the same as allowed for use during the fundamentals of engineering exam. Please see the following link for a list of acceptable calculators: <https://ncees.org/exams/calculator/> . Use of an alternative calculator during an exam will result in a zero on the exam.
- All personal items must be placed in a backpack or other personal bag, the backpack must be closed and placed on the floor prior to the exam.

- All exams are closed book. No study sheets are allowed. A sheet of equations will be provided with the exam for the student's use.

## **Plagiarism and Copying**

Plagiarism and copying will \*not\* be tolerated in this course. While it is encouraged that you discuss and work together on homework problems, direct copying of each-others answers is prohibited. Many homework assignments require written responses and each student is expected to write their own response.

Plagiarism is also not tolerated. Plagiarism is when you use someone else's words, ideas, assertions, data, or figures and do not acknowledge that you have done that (i.e. pass it off as your own original work). If you use the words, ideas, or even phrases from someone else or any published material you must:

1. Use quotation marks around the copied words or phrases AND cite the source; or
2. Paraphrase or summarize using your own words and phrases AND cite the source.

Any charts, graphs, data, images, or numerical information used from another source or published material must also be cited. If you are not familiar with citations please work with an NJIT librarian to learn more. This is all material that should have been covered in your first-year writing courses.

Student assignments will be submitted via a plagiarism detection software. Any evidence of plagiarism, copying, or cheating during exams, on homeworks, or on quizzes will result in an immediate grade of zero for the assignment and will be reported to the dean of students. A second instance of this will result in a failing grade for the course.

## **Extra Credit**

No extra credit will be offered for the course. The grading is designed to give students many chances to do well in the course. For more information why extra credit is not offered please review the following website:

<https://www.math.uh.edu/~tomforde/NoExtraCredit.html>

## **Course Reading**

You are required to complete the readings for the course prior to each class. The reading has been chosen to support the material given in class and should be given full attention.

## **Course Schedule**

Note: Course schedule is tentative and may change throughout the term. The instructor will communicate any changes. Class time is provided for topics of particular interest to students, or to provide additional instruction if class is running behind. Students wishing to suggest a special topic should speak with the instructor. (Note: Lectures are based on a twice per week, 1.5 hour class period, 14 week schedule). The course schedule is attached at the end of this syllabus.

## **Students with Disabilities**

NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (<http://www.njit.edu/counseling/services/disabilities.php>)

## **Academic Dishonesty and Student Conduct**

(Taken from the NJIT Academic Integrity Code linked below)

New Jersey Institute of Technology is an institution dedicated to the pursuit of knowledge through teaching and research. The university expects that its graduates will assume positions of leadership within their professions and communities. Within this context, the university strives to develop and maintain a high level of ethics and honesty among all members of its community.

Imperative to this goal is the commitment to truth and academic integrity. This commitment is confirmed in this NJIT University Code on Academic Integrity. The essential quality of this Code is that each student shall demonstrate honesty and integrity in the completion of all assignments and in the participation of the learning process. Adherence to the University Code on Academic Integrity promotes the level of integrity required within the university and professional communities and assures students that their work is being judged fairly with the work of others. For more information on the code of academic integrity please see: <http://www.njit.edu/education/pdf/academic-integrity-code.pdf>

## **Class Behavior**

While the university is a place where the free exchange of ideas allows for debate and disagreement, all classroom behavior and discourse should reflect the values of respect and civility. Behaviors that are disruptive to the learning environment will not be tolerated and students will be asked to leave the classroom. This includes but is not limited to aggressive behavior, sleeping in class, disruptive behavior, use of electronic devices for activities not related to coursework, racist, sexist, ableist, or homophobic language, and inappropriate or crude language.

Any student that prefers to use a particular pronoun should let the professor know so that this can be accommodated.

**E-mail communication with the professor and each other is expected to be professional.** Any e-mails received by the professor that are not professionally formatted and stated will not be answered. Examples of professional e-mail etiquette can be found at the following links:

<http://www.wikihow.com/Write-a-Formal-Email>

<http://englishlive.ef.com/blog/write-perfect-professional-email-english-5-steps/>

<https://owl.english.purdue.edu/owl/resource/636/01/>

## Legal Disclaimer

Students' ability to meet outcomes listed may vary, regardless of grade. They will achieve all outcomes if they attend class regularly, complete all assignments with a high degree of accuracy, and participate regularly in class discussions.

This syllabus is subject to change at the discretion of the instructor throughout the term.

## Sample Homework Layout

Matthew Adams

Homework 1  
CE 702 W2017

Page 1 of 1

### Question 1

#### Given:

List the resources and emissions associated with the life of a washing machine. Provide both the resources input to each step, and the emissions output. Your answer should be in the form of a cycle diagram as done in class.

#### Solution:

Figure 1 presents the inputs and outputs from the manufacture of a washing machine.



Figure 1: Inputs and outputs from the manufacture of a washing machine [Ashby 2014]

This image shows the resources required and emissions from each step of the manufacture of a washing machine. Significant greenhouse gas emissions can be noted during the material production and product manufacturing phase and energy is required as an input for each phase of the cycle.

#### References:

Ashby, Michael F., 2014, Materials and the Environment: Eco-informed Material Choice, Elsevier Science, St. Louis



# CE 360 in the Time of COVID-19

This document outlines what will happen moving forward in CE-360 in light of the changes due to NJIT's move to online courses. Your patience and cooperation are appreciated during this time.

Much of the interaction for the class will be through Canvas and WebEx. I will be utilizing my personal WebEx room for face-to-face interaction. It can be found at

<https://njit.webex.com/meet/adams>

Video address: [adams@njit.webex.com](mailto:adams@njit.webex.com)

Pin: 1879 (Needed when calling in from a phone)

If you do not have access to the internet or a computer regularly, please work with the office of the Dean of Students to resolve this situation. Professor Adams cannot help you directly, but the University has resources available to students in need.

## **Lectures**

The following changes will happen to lecture:

- All lectures will be given via recorded video.
- Lectures will be posted on pages in the “modules” section of Canvas.
- Lectures will be posted by 2 pm on Tuesday of each week.
- Professor Adams will be in his personal WebEx room from 7-8:30 pm each Tuesday night in his personal room to answer questions about the lecture/quiz/exercise for that week.
- It is expected that you will watch and interact with the lectures during normal class time (Tuesdays from 6-9 PM)

## **Office Hours**

Office hours will be moved to online via Professor Adams's personal WebEx Room

- Professor Adams will be available from 2-5 pm each Tuesday in his WebEx room for office hour questions.
- Professor Adams will also be available via phone during this time (973-596-3681) as well
- As always, if you cannot meet during this time but need to discuss something or have a question: please reach out to Prof. Adams via email to set up a better time.

## **Quizzes and Exercises**

Quizzes and Exercises will now be combined. There are 4 quizzes and 2 exercises remaining, and 6 weeks of class left.

- Each week, at 6 pm, an online quiz will be posted on Canvas. You will have until 11 PM to complete the quiz.
- The quiz will be based on that week's lecture, and will require you to interact with the lecture materials that are posted. It is suggested that you open the quiz, and answer it as you follow along with the lecture.

- All quizzes will now be graded for completion, no quizzes will be graded for correctness.
- There will be no quiz on March 31<sup>st</sup>, due to the exam. April 14<sup>th</sup> will have a two slightly shorter quizzes to make up for this.

### **Homework**

Homework will continue as normal.

- Homework 3 is due March 24<sup>th</sup> at 11:59:59 PM via Canvas's submit tool
- Homework 4 and 5 will be posted on April 7<sup>th</sup> and April 21<sup>st</sup>, respectively.

### **Exams**

Exams will now be conducted entirely online using the quiz function on Canvas.

- It is expected that you will take the exams alone.
- The exams will be open book, as such, no information on equations will be provided to you.
- The exams will be opened at 6pm and closed at 9 pm on exam days.
- Exam 2: March 31
- Exam 2 will cover lectures from Cement Production THROUGH Supplementary Cementing Materials and Sustainable Concrete Mixtures
- Final Exam: May 12
- The Final Exam will be cumulative from the whole term.

If you have any questions please contact me at 973-596-3681 or at [adams@njit.edu](mailto:adams@njit.edu)

Information on using WebEx can be found: <https://ist.njit.edu/webex/>

Information using Canvas can be found: <https://canvas.njit.edu/getting-started-canvas>